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DEPARTMENTS.

SOLUTIONS OF PROBLEMS.

ALGEBRA.

262. **Proposed by REV. R. D. CARMICHAEL, Hartselle, Ala.**

Sum to infinity the series $\frac{n}{(4n^2-1)^2}$, beginning with $n=1$, n being always odd.

Solution by G. B. M. ZERR, A. M., Ph. D., Parsons, W. Va.

$$\frac{n}{(4n^2-1)^2}=\tfrac{1}{8}\left(\frac{1}{(2n-1)^2}-\frac{1}{(2n+1)^2}\right).$$

When $n=1, 3, 5, 7, \ldots$

$$\Sigma\frac{n}{(4n^2-1)^2}=\tfrac{1}{8}\left(\frac{1}{1^2}+\frac{1}{5^2}+\frac{1}{9^2}+\ldots-\frac{1}{3^2}-\frac{1}{7^2}-\frac{1}{11^2}-\ldots\right)$$

$$=\tfrac{1}{8}\left(\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\frac{1}{7^2}+\ldots\right)-\tfrac{1}{4}\left(\frac{1}{3^2}+\frac{1}{7^2}+\frac{1}{11^2}+\ldots\right)$$

$$=\frac{\pi^2}{64}-\tfrac{1}{4}(.1579+\ )=\frac{\pi^2}{64}-\tfrac{1}{4}\cdot\frac{2\pi^2}{125}\text{ nearly, }=\frac{\pi^2}{64}-\frac{\pi^2}{250}=\frac{93\pi^2}{8000}.$$

We may also write

$$\Sigma\frac{n}{(4n^2-1)^2}=\sum_{m=1}^{\infty}\frac{2m-1}{(16m^2-16m+3)^2}=\tfrac{1}{8}\int_0^1\frac{\tan^{-1}x}{x}dx.$$

This series is discussed by William E. Heal in Vol. IX, pp. 47—49, of the MONTHLY.*

Similar approximations were obtained by S. A. Corey, G. W. Greenwood, and J. Scheffer.

263. **Proposed by O. E. GLENN, Ph. D., Springfield, Mo.**

Express the transcendentals e and π in the form of infinite continued fractions.

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*See also an article entitled "Note on the Numerical Transcendants S_n and $s_n=S_n-1$," by Professor W. Woolsey Johnson, in the current *Bulletin of the American Mathematical Society*.